**Final Report**

Cruise M73/1 “LIMA-LAMO” with German R/V *Meteor* studied the western Ligurian Margin off Southern France. This area in the northeastern part of the western Mediterranean Sea represents a passive, but tectonically active margin with a lot of microseismicity and mass wasting. Given the highly dynamic setting and complexity of collision zones in the Mediterranean Sea, many processes are still poorly understood. Among the shortcomings in understanding collision zones, the temporal variation of deep-seated processes as well as their manifestations at shallower levels is the emerging key question. As a consequence, both marine and continental geosciences, including scientific drilling, accommodated accordingly and have started long-term observation. Boreholes (e.g. in Greece [Corinth], Germany [KTB], California [SAFOD]), and even wider areas on the ocean floor (e.g. in the Monterey Bay [MARS], the Sagami Bay in Japan, or the Juan de Fuca plate [NEPTUNE]) are implemented with *state-of-the-art* technology to measure and monitor parameters *in situ* in space and time. In Europe, ESONET has identified a total of 203 data end-users in 11 countries with a wide-spread need for data monitoring of the solid earth beneath the sea, the interface between the solid earth and sea, and the water column. Two of the strongest partners, the University of Bremen (Germany) and IFREMER Brest (France) have now joined forces on a multi-disciplinary level to work at the Ligurian Margin within ESONET and the Integrated Ocean Drilling Program (IODP). The overall goal is to provide a profound basis for ocean drilling and monitoring. The shorter term goals were related to landslide processes, turbidites, and other consequences of slope instability in the Var Canyon and turbiditic system and the Baie des Anges.

The study area can be divided into five regions:

i. The Nice airport slide and adjacent stable slope in 20-300 m water depth;

ii. The mid-slope with both ridges and gullies where the landslide mass was traveling, including some unaffected stable slope regions, all in 500-1000 m water depth;

iii. The deeper slope (1500-2000 m water depth) adjacent to the Var Canyon with landslide scars and talus (“western slide”);

iv. An even larger slide complex further away from the canyon system (“eastern slide”); and
v. The Var Canyon region with its flanks, terraces, and channels in down to approximately 2500 m water depth.

In area (i), we used a variety of methods to shed light on the 1979 Nicea airport landslide. This included the use of a ROV (Remotely Operated Vehicle) with a CTD mounted to it to locate fresh water outflow. We also carried out Cone Penetration Tests (CPTU) and heat flux measurements, and sampled the area by gravity core. In all other four regions, we did not use the ROV or CTD and completely relied on in situ measurements and coring. The research programme was complemented by seafloor mapping and seismic reflection profiling. A full track chart of all operations, juxtaposing the bathymetric chart of the area, is provided in the figure attached.

Initial tentative results gain many new insights in the various study regions. At the northernmost area (i) adjacent to the Nice airport, attest that in conjunction with the construction work south of the airport, fresh water flux in coarse-grained sediments at the margin seem to be the most likely landslide triggers. Pore water salinity was found to be about 20% of normal seawater in those layers right at the headwall of the landslide scar. In gravity cores immediately east or west along strike, normal salinity was found. Charging of sediments with ground water originating further north was confirmed by excess pore pressure signals during CPTU deployments. The entire area was mapped using the high resolution SIMRAD EM710 system, which reveals small-scale steps and scars in the landslide scar. ROV surveys along these small scars show steep walls and talus immediate downslope of them, both being indicative of very recent seafloor sediment deformation.

In area (ii), we visited four channels which are proposed pathways of the 1979 wasted mass. Coring, which was characterised by either low or no recovery in those locations, provided indirect evidence for high transport rates and no deposition in the recent past. Sediment gets accumulated on the flanks and crests of the ridges where undisturbed successions of hemipelagics were recovered. CPT and HF deployments were hindered by low penetration and did not

In areas (iii) and (iv), two extensive landslide scars were studied somewhat east of the main channel of the Var Canyon system. Either feature was imaged by a series of seismic reflection profiles. The distinct bodies of redeposited material were then sampled together with reference sediments outside the features. Materials are mainly silty clays with some coarser sections. Pore water showed regular seawater composition,a dn a more detailed post-cruise analyses is required to illuminate mass wasting dynamics and timing.

In area (v), there is evidence for turbidites and mass wasting deposits all over the Var Canyon system, often with sharp erosive surfaces at the base. The comprehensive coring program recovered push cores from a variety of sites which were visited with the same device 2 years ago. Results from cruise M73-1 confirm the earlier findings by providing excellent agreement (and hence very little recent deposition) in the majority of the cases.

**M73-1 track chart:**